FiTQun One-Ring NLL curves

SORBONNE UNIVERSITÉ

Calculating the NLL and making a curve

- In fiTQun, the negative log likelihood (NLL) is calculted using the fiTQun::GetOneRngnglogL function for the one ring fit

```
2869  double fiTQun::GetOneRngnglogL(int iPID, double *X, int& PCflg, int iring){
2870    if (iring<0) {
2871      iring=fiTQun_shared::nring-1;
2872    }
2873
2874    Resetmuring(iring);
2875    PCflg=OneRing(iPID,X,iring);
2876    return nglogL();
2877  }
```

- We make a NLL curve by calculating the NLL for different inputs *X and plotting the results

Calculating the NLL and making a curve

```
2559    lnlval=OneRingFit(iPID,X,PCflg);
2560    if (iPID == ie) {
2561    if (ipeak == 0) {
2562
2563    std::ofstream outputFile("results.txt");
2564
2565    double testparameters[fiTQun_shared::nSnglTrkParams];
2566    testparameters[0]=X[0];
2567    testparameters[1]=X[1];
2568    testparameters[2]=X[2];
2569    testparameters[3]=X[3];
2570    testparameters[4]=X[4];
2571    testparameters[5]=X[5];
2572    testparameters[6]=X[6];
2573    testparameters[7]=X[7];
2574
2575
2576    outputFile << "momenta" << "\n";// Fit Result: " << testparameters[6];
2577    for (double i = X[6]-10;i<X[6]+10; i+=0.1) {
2578      testparameters[6]=i;
2579      double result;
2580      int PCdumflg;
2581      int iring=staticthis->cring;
2582
2583      result = staticthis->GetOneRngnglogL(iPID,testparameters,PCdumflg,iring);
2584      outputFile << i << " " << result << "\n";
2585    }
2586    testparameters[6]=X[6];
```

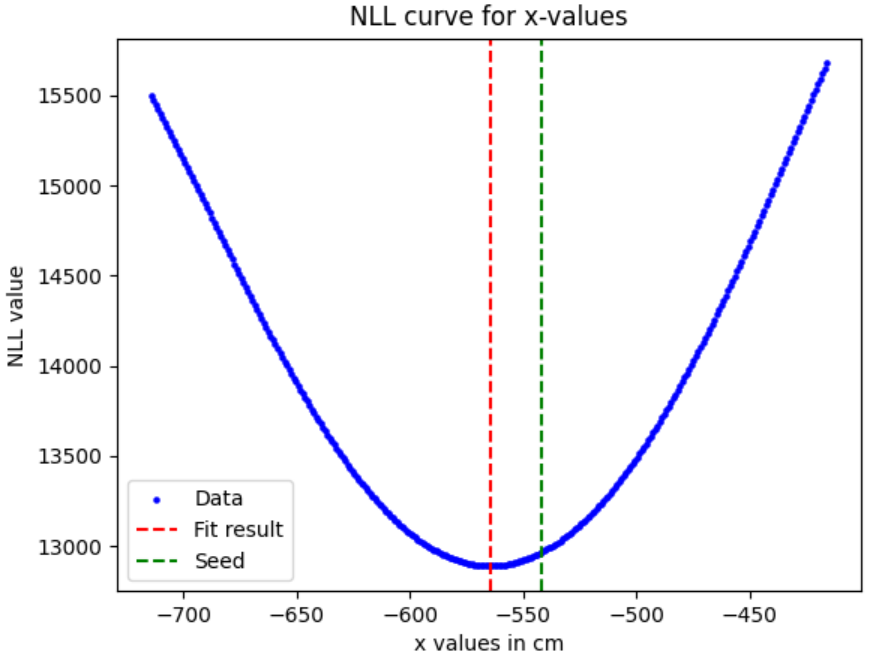
Calculate the NLL values inside the Do1RFit function after the final fitting step

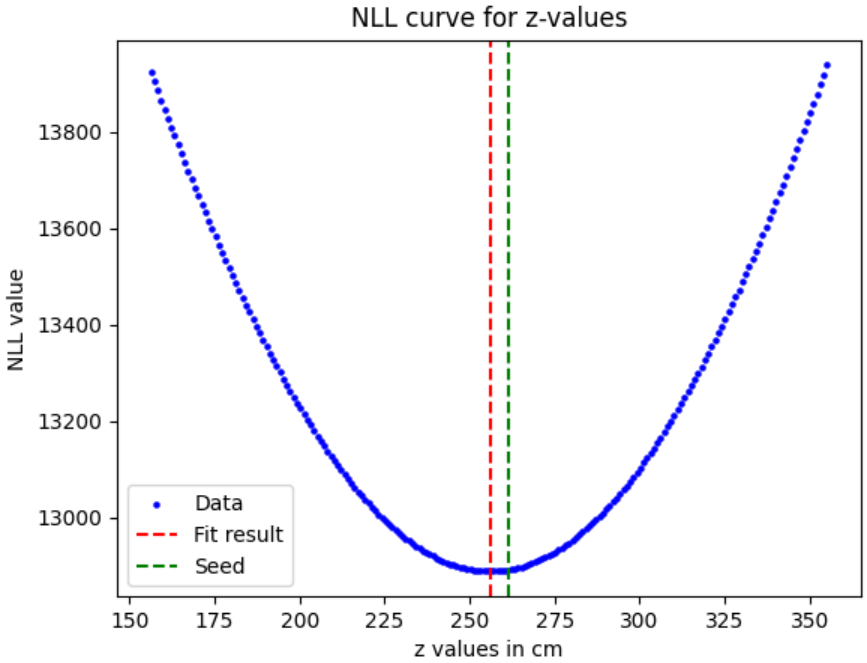
Electrons

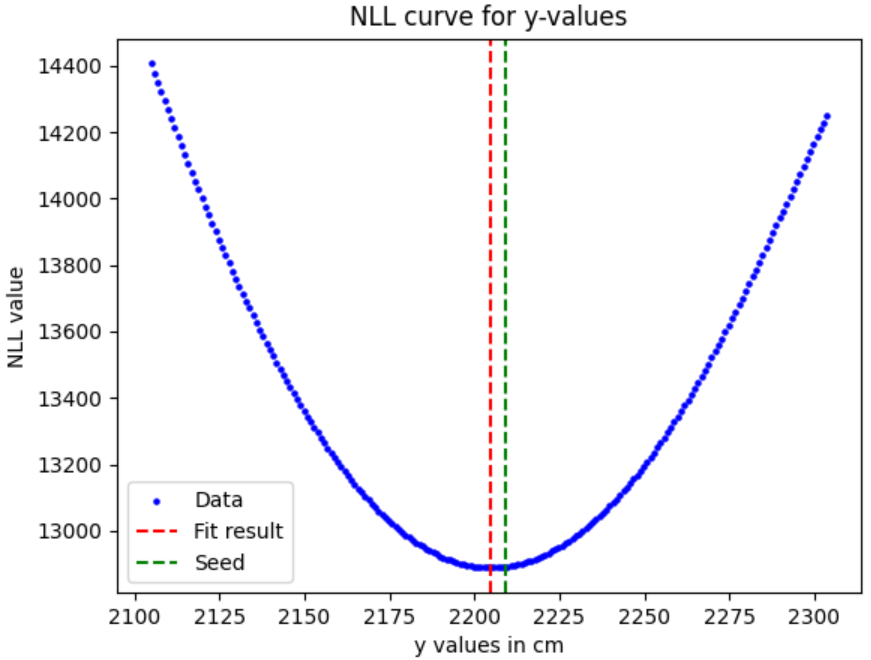
(Positions)

Random position and direction in the detector

500MeV energy





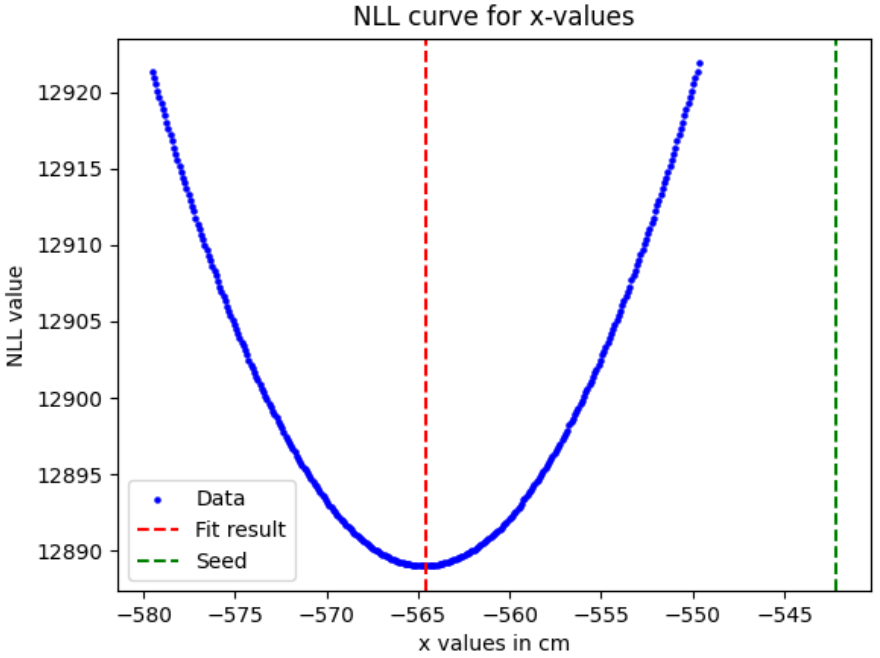


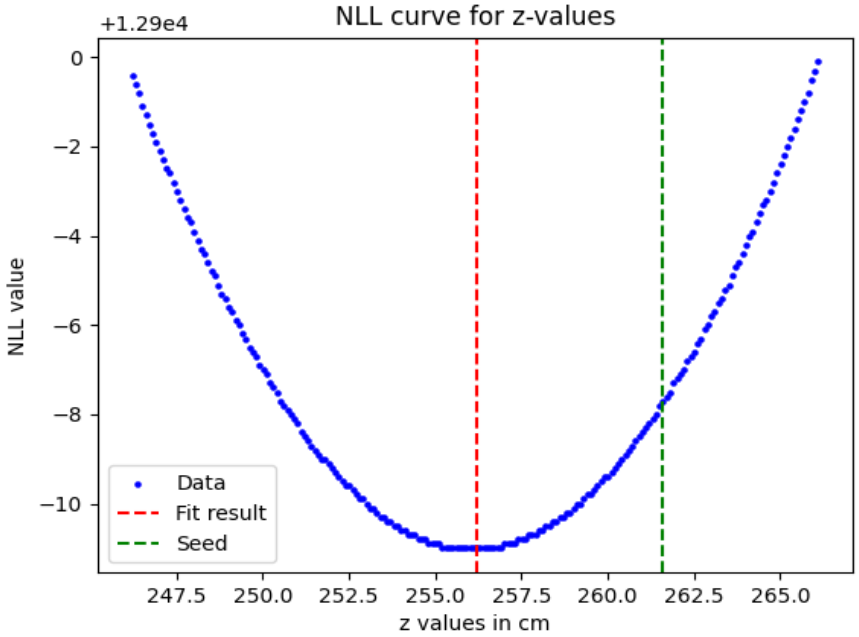
Electrons (zoomed)

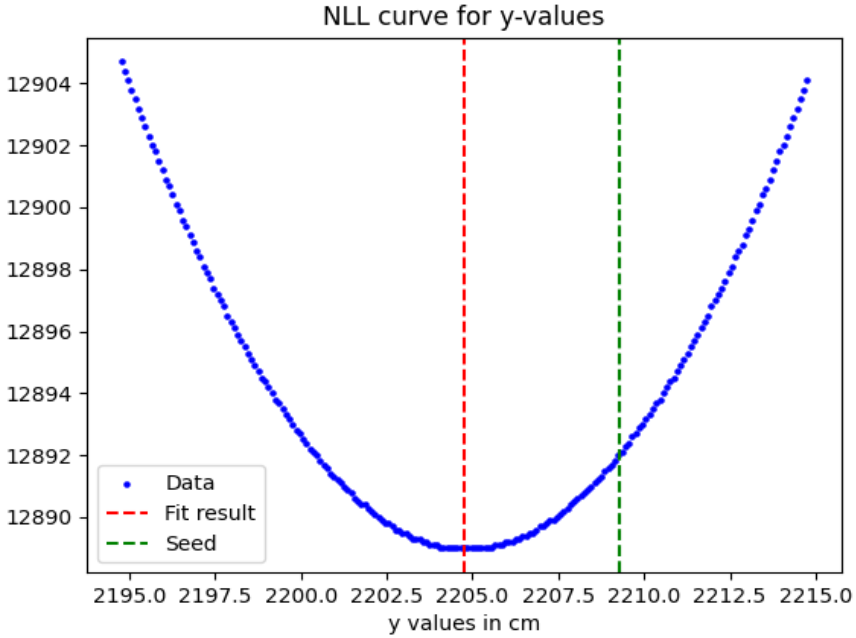
(Positions)

Random position and direction in the detector

500MeV energy





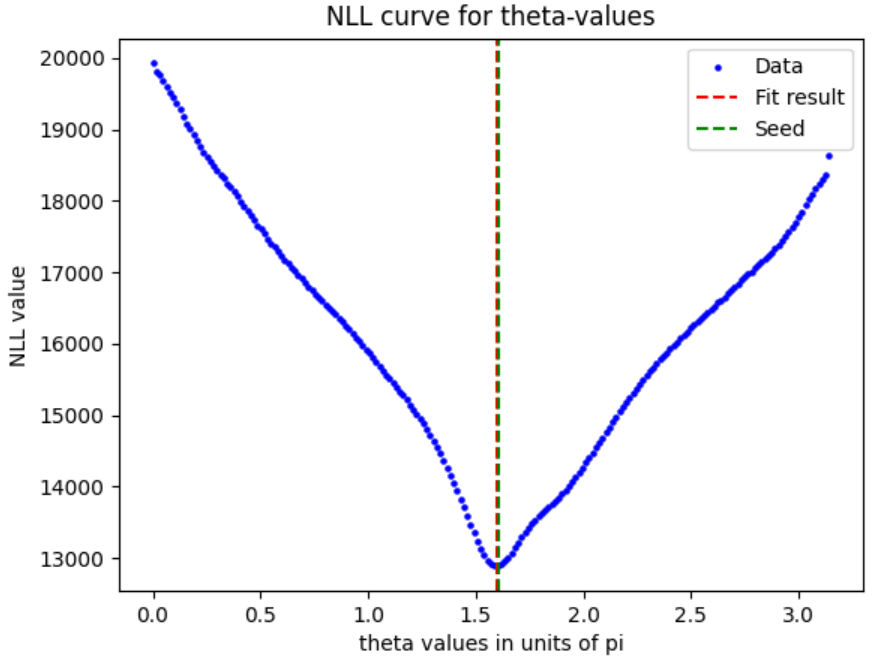


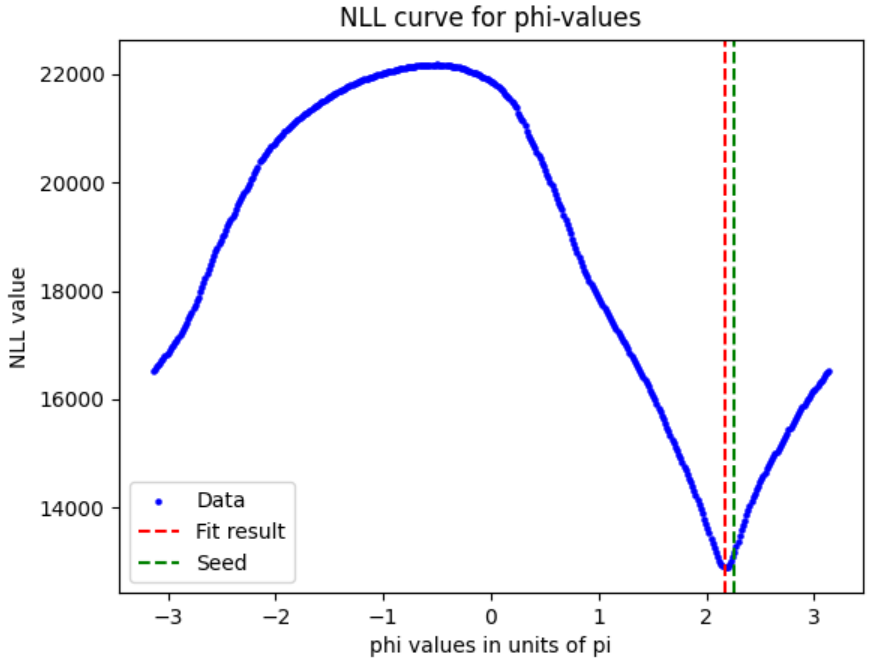
Electrons
(Direction)

Random position and direction in the detector

500MeV energy

Direction fit result converted from cartesian coordinates





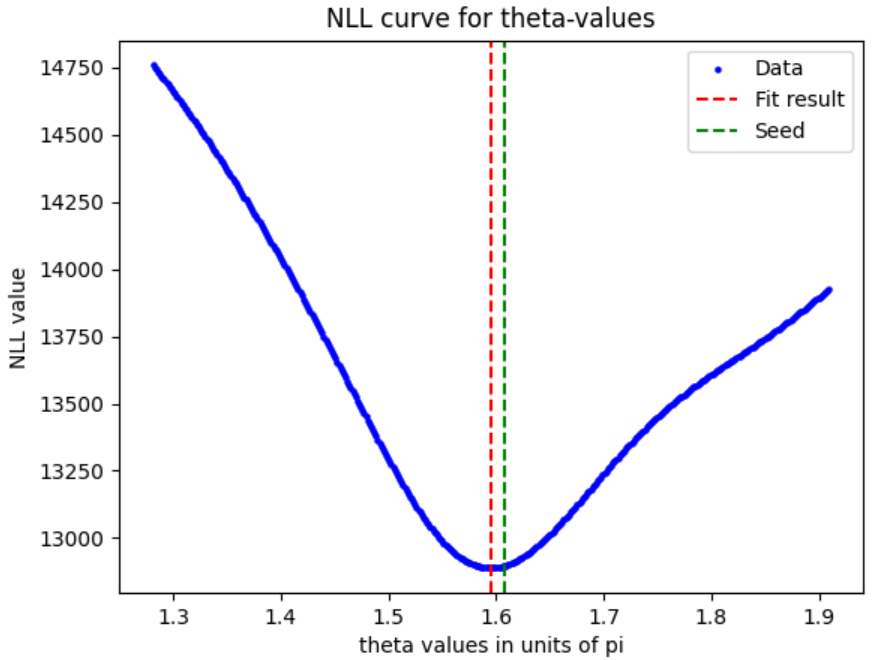
Electrons (zoomed)

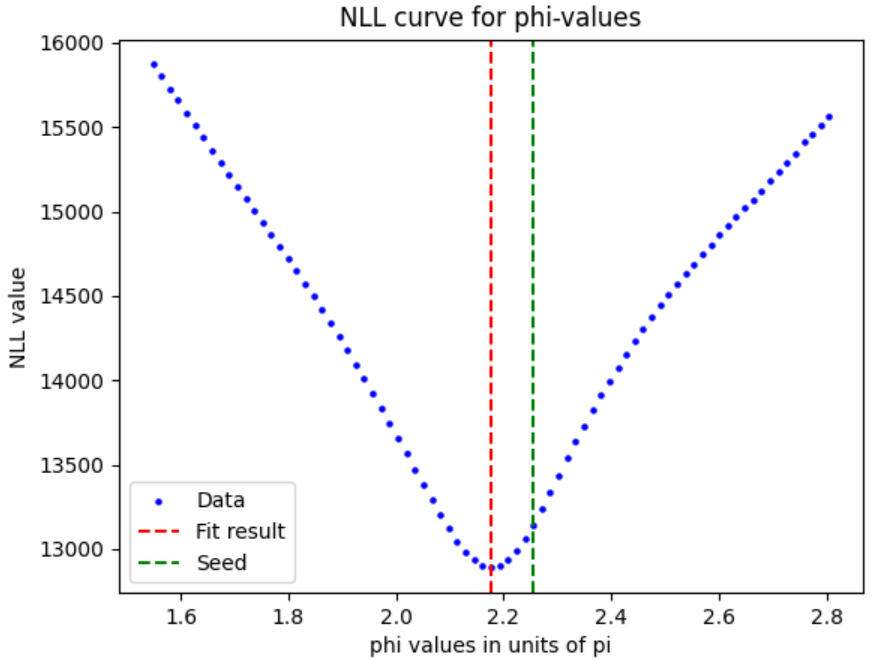
(Direction)

Random position and direction in the detector

500MeV energy

Direction fit result converted from cartesian coordinates



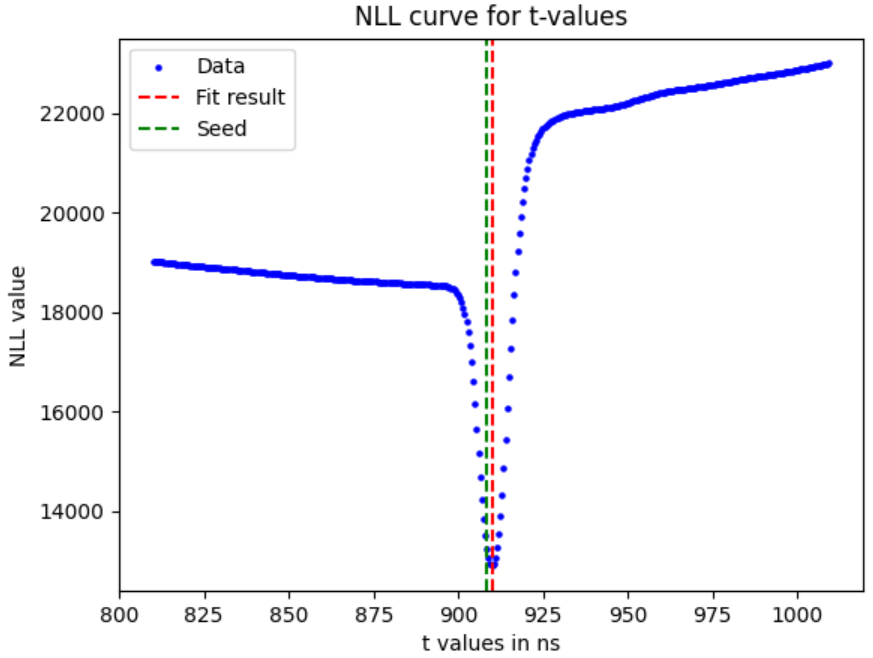


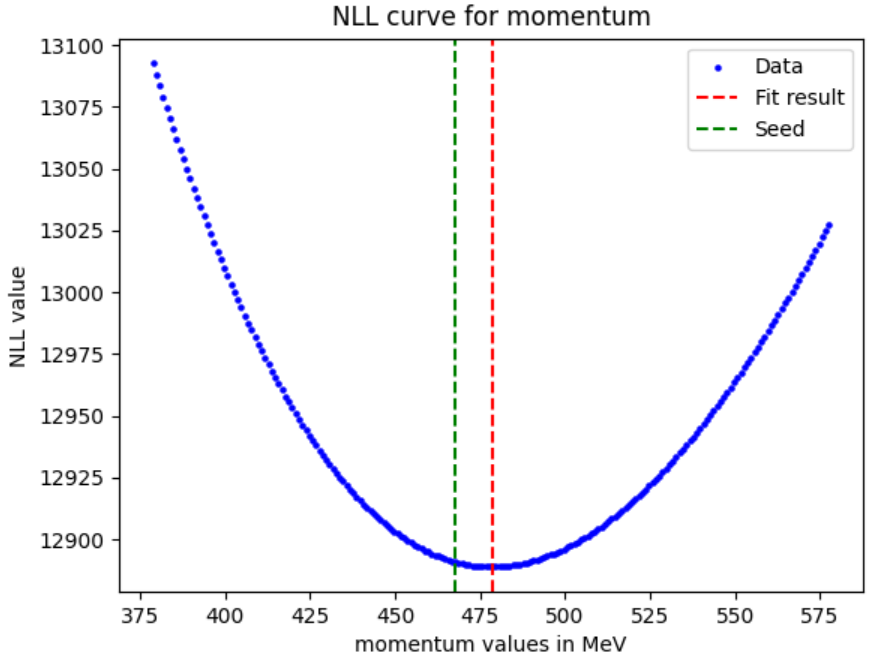
Electrons

(Time and Momentum)

Random position
and direction in the
detector

500MeV energy



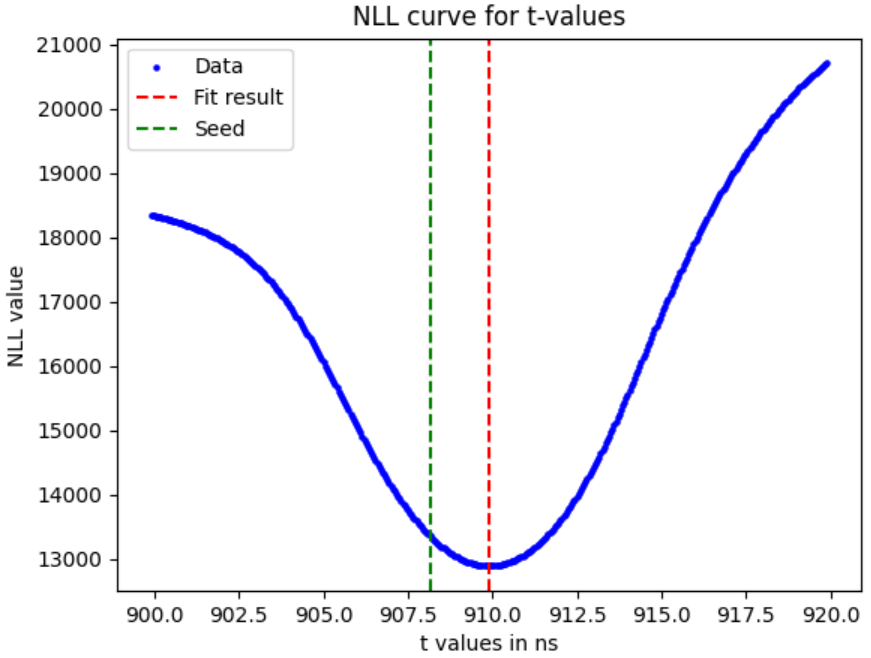


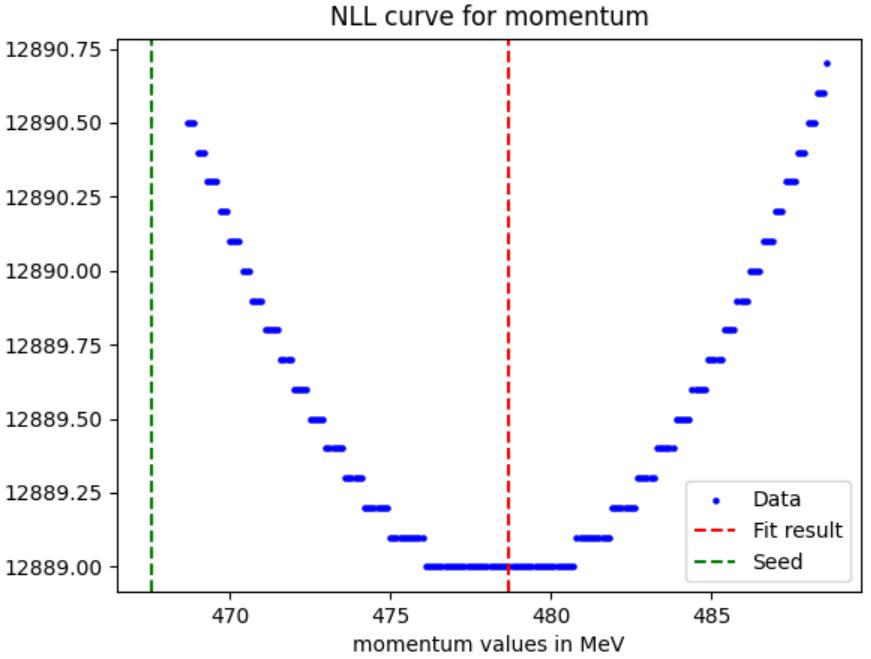
Electrons (zoomed)

(Time and Momentum)

Random position
and direction in the
detector

500MeV energy





Fit result corresponds
well to NLL curve
minimum

Does it look this good for Muon events as well?

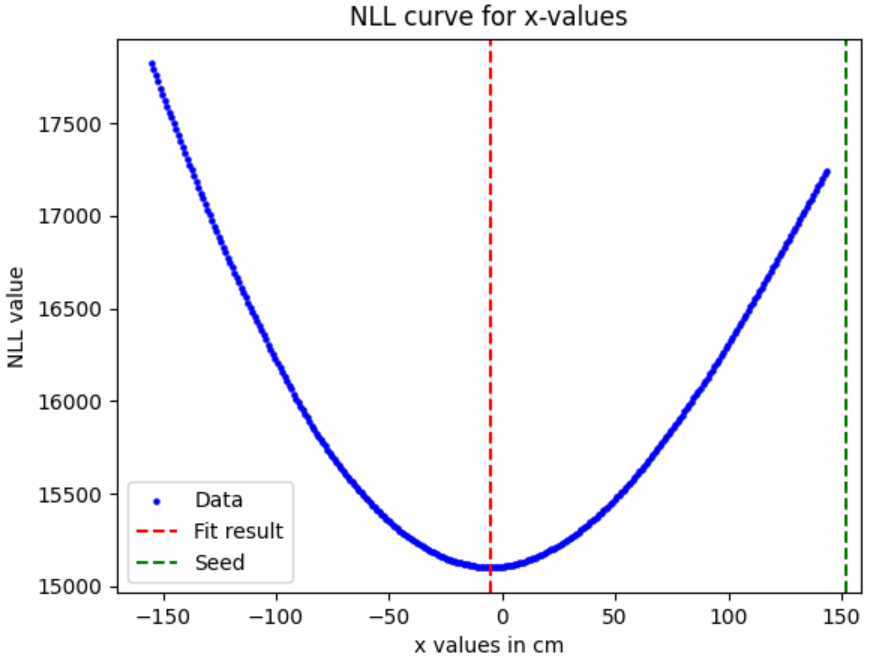
Muons

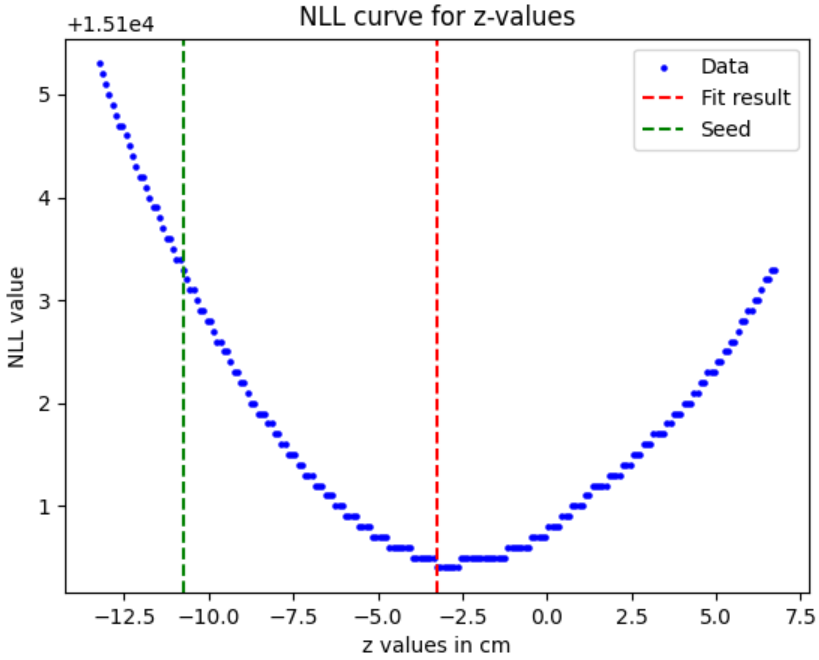
(Positions)

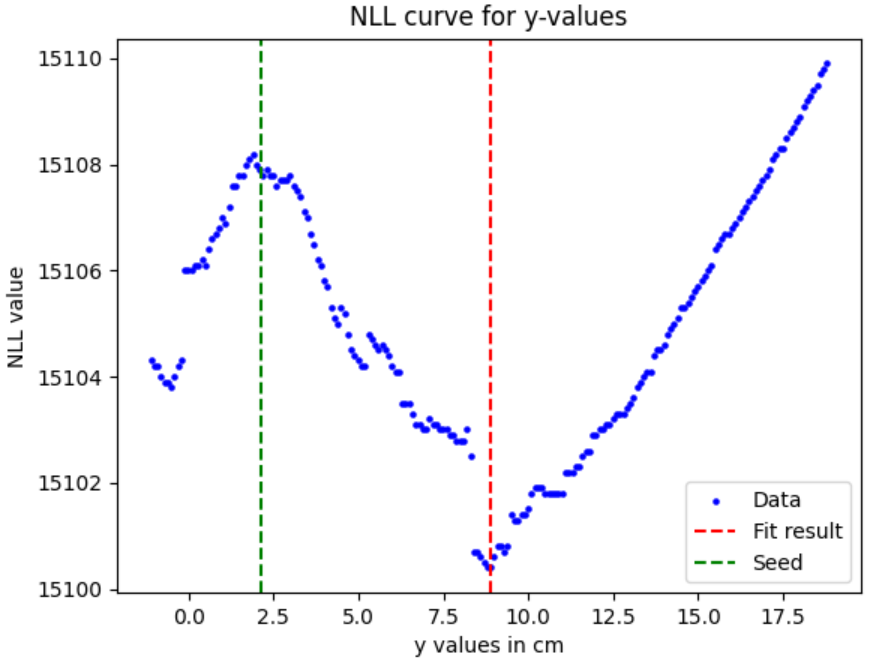
Muon at origin and in x-direction

500MeV energy

Fit hits the minimum, but y-curve strange





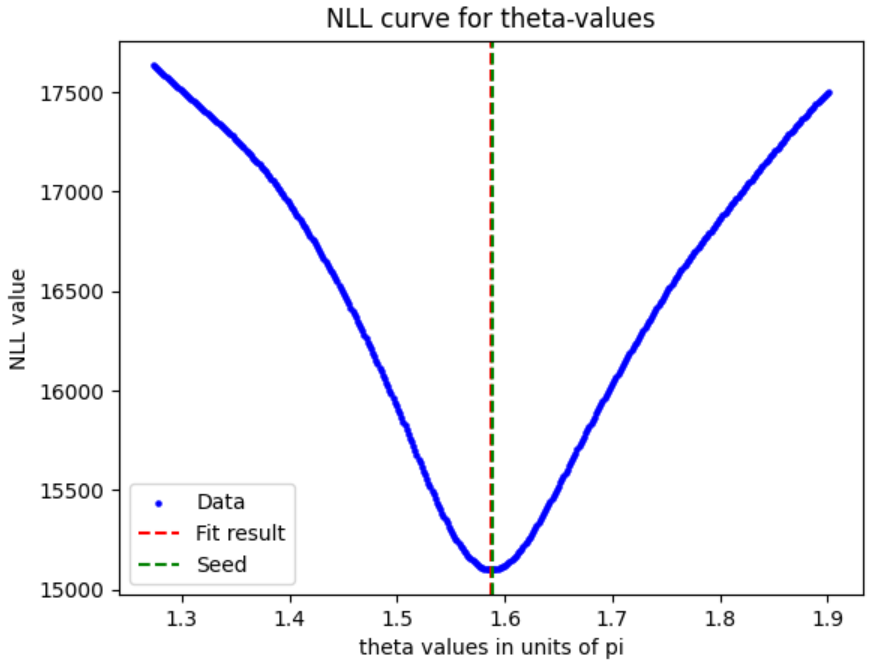


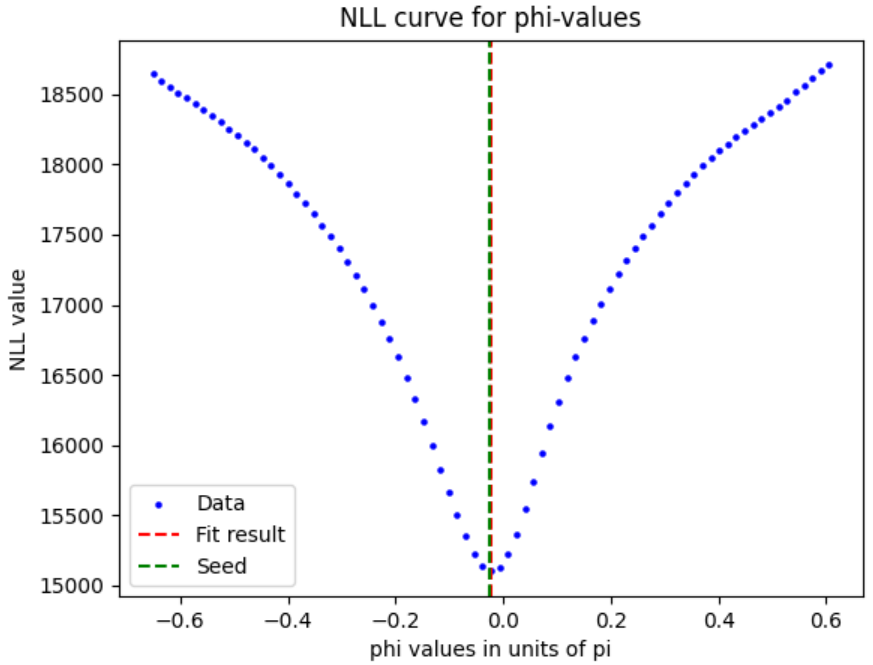
Muons
(Direction)

Muon at origin and in x-direction

500MeV energy

Direction still looks good





Muons

(Time and Momentum)

Muon at origin and in x-direction

500MeV energy

Time fit corresponds to curve minimum

Momentum fit fails to find the minimum